Distributed Generation Improvements in Industrial Applications

U.S. Department of Energy
OPT Industrial DG Program
Annual Review

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www.industrialcenter.org

Project Statistics

- Contract competitively awarded to the Industrial Center in response to RFP No. 340002748
- Project initiated in December 2000
- Cost Share: Industrial Center team 85% and DOE 15%

DER Strategic Plan Mid-Term Goal

"…… reduce costs and emissions, and increase the efficiency and reliability of a suite of distributed energy technologies to achieve a 20 % electric capacity addition of 26.5 GW."

Joint Program Between DER and a Consortium of Energy Utilities Supports the Strategic Plan

- **Our market assessment projects an 11 GW increase for the industrial sector (Phase I)**

  Key subcontractors: RDC and CSGI Inc.

- **Industrial CHP demonstrations and "Applications Manual" to help customers select more efficient, more reliable, and lower cost systems (Phase II)**

  Key subcontractors: Exergy Partners and Energy Nexus Group

DG Consortium
of
Energy Utilities

Dominion Energy

Enbridge Consumers Gas

Exelon Corp. (PECO)

KeySpan Energy

Michigan Consolidated Gas

National Fuel Gas

Nicor Gas

NiSource Inc.

NW Natural

Southern Natural Gas

SoCal Gas Co.

TXU Electric and Gas

Wisconsin Gas Co.

Yankee Gas Services Co.

What and Where is the Market Potential for Industrial CHP Systems up to 1 MW ?

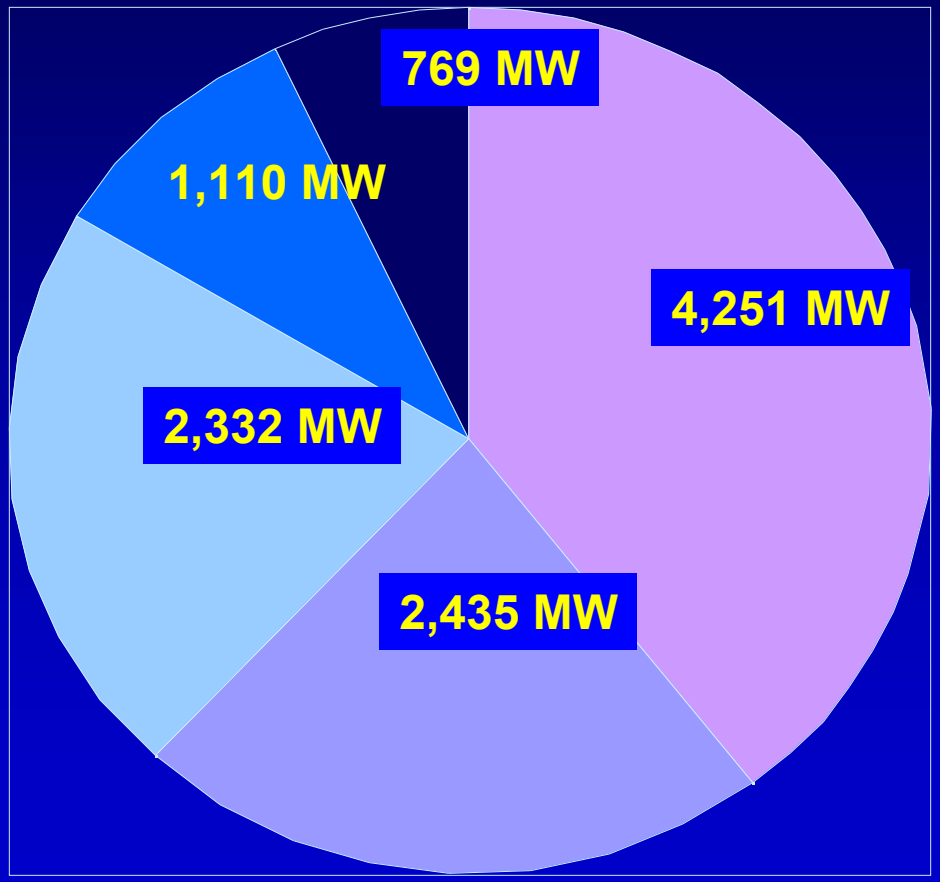
Study completed by RDC and CSGI in June 2002

Approach

- **Analyzed industrial thermal processes and determined annual energy consumptions by SIC**
- **Developed integrated DG cogeneration process schematics for *very "replicable" systems.***
- **Chose the five leading thermal processes that could be easily integrated into a cogeneration system and that offered the largest energy savings potential**

Market Assessment

Top 5 Industrial CHP Systems 11 GW Potential



Industrial Center

11 GW Total Economic Potential for Units up to 1MW

KEY POINTS:

- ✓ **Units between 800 –1000 kW capture more than half of the new load (6 GW)**
- ✓ **Unrecuperated turbines and reciprocating engines the leading power providers (92%)**
- ✓ **Applications that have low thermal system efficiencies and low retrofit costs are favored.**

Barriers Identified

- ✓ **Product performance and availability**
- ✓ **Lack of off-the-shelf integrated systems**
- ✓ **Presence of a supporting market infrastructure**
- ✓ **Awareness, information, and education of end users**
- ✓ **Demonstration of successful case studies**
- ✓ **Environmental regulations**
- ✓ **Planning, zoning, and codes**
- ✓ **Tax treatment**
- ✓ ***Utility rate structures***
- ✓ ***Interconnection standards***

Phase II: Demonstrations and Market Transformation

- Initiated in September, 2001
- DG Consortium membership identified and screened 26 candidate sites
- Two of five demonstration sites selected

use the waste heat – minimize site engineering – standardize designs

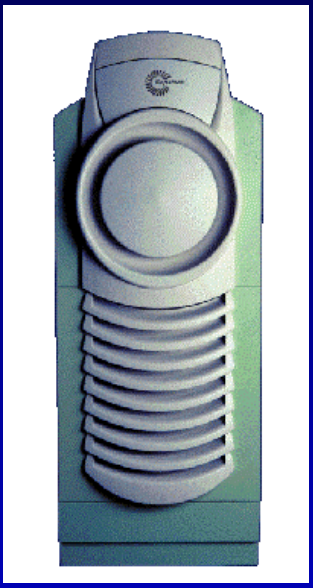
Food Processing

Site:	**C & F Packing, Lake Villa, IL**
Product:	**Processed meat and sausages**
Cons. Utility:	**Nicor Gas**
Power Gen.:	**Two 1125 kW Waukesha Engines**
Heat Rec.:	**Boiler feed-water preheating**
Operation:	**9 am to 10 pm**
Status:	**New meat processing facility in shakedown operation**
Comments:	**Rate response driven operation; steam used in direct contact steamers; potential to expand heat utilization**

Metal Plating

Site:	**Faith Plating Co. in Los Angeles, CA**
Product:	**Chrome plating shop for motorcycles**
Cons. Utility:	**Southern California Gas Company**
Power Gen.:	**Four 30 kW Capstone micro-turbines**
Heat Rec.:	**Hot water for plating tank heating**
Operation:	**base loaded**
Status:	**Units placed in operation during fourth quarter 2001**
Comments:	**Customer interested in using waste heat from the Unifin heater for sludge drying for maximum heat recovery**

2002 Activity Plan



- Complete site agreements and data plans
- Install data acquisition systems and collect data for the Nicor and SoCal sites
- Prepare case histories and initial content for the applications manual:
  - cost/benefit screening tools (d-gen Pro)
  - web-based resource and equipment guide
- Screen and select additional Industrial CHP demonstrations for the five key process applications

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Appendix

Industrial Center and Consortium Statistics

Industrial Center

Provides commercialization & market development support for natural gas technologies in the industrial sector

- Established in 1991 (spin-off from AGA)
- 501(c) 6 trade association of 28 energy utilities and associated companies
- Located in Washington, DC
- Executive Director: David Weiss
- *Consortium approach* to products and services

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Current Industrial Center Consortia

- Air Toxics Compliance
- Heat Treating
- Engine-driven Air Compressors
- Infrared Paper Drying
- Industrial Refrigeration
- Plastics Alliance
- Vacuum Furnace and
- ***Distributed Generation (DG)***

Industrial Center DG Consortium Membership Statistics

- **Members:** *Fourteen utilities*
- **Product Champions:** *Henry Mak, SoCal Gas*
  Bob Scott, NiSource
- **Technology Lead:** *Bob Fegan, MichCon*
  Interconnect Standards
- **Center Coordinator:** *Richard Biljetina*

Industrial CHP Support

- **DOE Office of DER & Industrial Center provide**
  - CHP integration and design engineering
  - data acquisition for minimum of 6 months
  - case studies and market transformation tools
- **DOE Office of DER & Industrial Center**
  - retain data rights
  - make public results of DG projects
- **Host site finances, owns, operates and maintains total system**